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Seo et al.

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(54) **REFRIGERATOR**

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F25D 23/02 (2006.01)
F25D 23/04 (2006.01)

(52) **U.S. Cl.**

CPC ***F25D 23/025*** (2013.01); ***F25D 23/04*** (2013.01); *F25D 2323/023* (2013.01)

(58) **Field of Classification Search**

CPC . F25D 23/025; F25D 23/04; F25D 2323/023
USPC 312/405.1, 405, 291, 292
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,927,398 A * 9/1933 Glasser 62/377
1,984,977 A * 12/1934 Mize 312/276
2,131,680 A * 9/1938 Zahodiakin 62/266
2,135,878 A * 11/1938 Sekyra, Sr. 62/252
2,150,064 A * 3/1939 Robert et al. 62/266
2,917,355 A * 12/1959 Squire 312/405.1
2,942,438 A * 6/1960 Schmeling 62/377
2,945,733 A * 7/1960 Malia 312/200
7,651,182 B2 * 1/2010 Eveland et al. 312/405.1

(Continued)

FOREIGN PATENT DOCUMENTS

CN 2913985 Y 6/2007
CN 101542223 A 9/2009

(Continued)

OTHER PUBLICATIONS

Chinese Office Action dated Jul. 28, 2014 issued in Application No. 201210459287.5.

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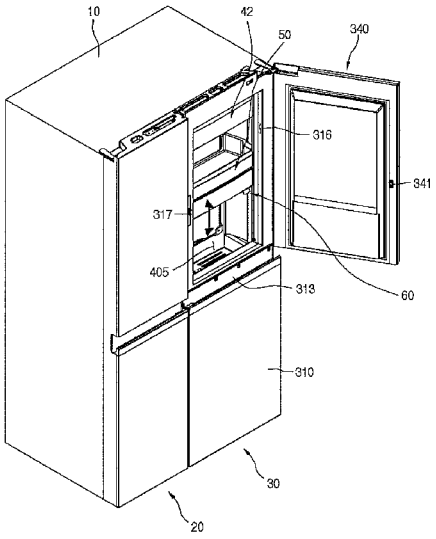
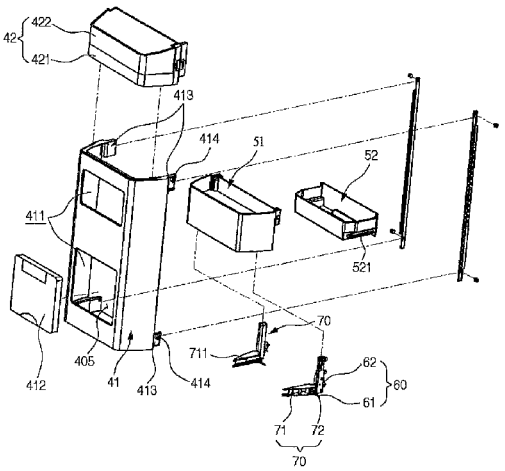
(57) **ABSTRACT**

A refrigerator is provided. The refrigerator may include a moving basket installed in a storage case provided in a door or main body of the refrigerator. The moving basket may be vertically movable within the storage case. A height of the moving basket may be adjustable by an operation mechanism, to efficiently utilize an inner space of the storage assembly.

17 Claims, 20 Drawing Sheets





(56) **References Cited**

U.S. PATENT DOCUMENTS

2003/0011291	A1*	1/2003	Moreno-Olguin et al.	312/405.1
2010/0031690	A1*	2/2010	Becke	62/377
2010/0176702	A1*	7/2010	Kim	312/405.1
2010/0270902	A1*	10/2010	Kim et al.	312/405.1
2010/0326122	A1*	12/2010	Seo et al.	62/449
2011/0023528	A1*	2/2011	Kwon et al.	62/441
2012/0293056	A1*	11/2012	Kim	312/405.1

FOREIGN PATENT DOCUMENTS

CN	101929784	A	12/2010
CN	102230713	A	11/2011
JP	2000-065459	A	3/2000
WO	WO 2004/059228	A1	7/2004
WO	WO 2011/093577	A1	8/2011

* cited by examiner

FIG. 1

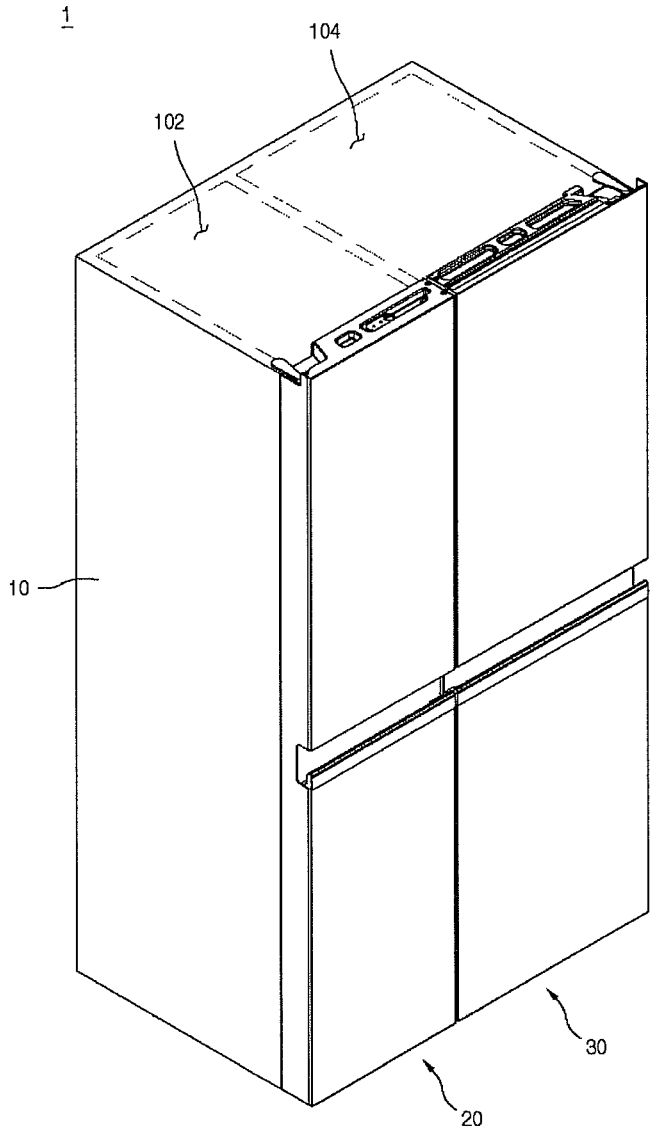


FIG. 2

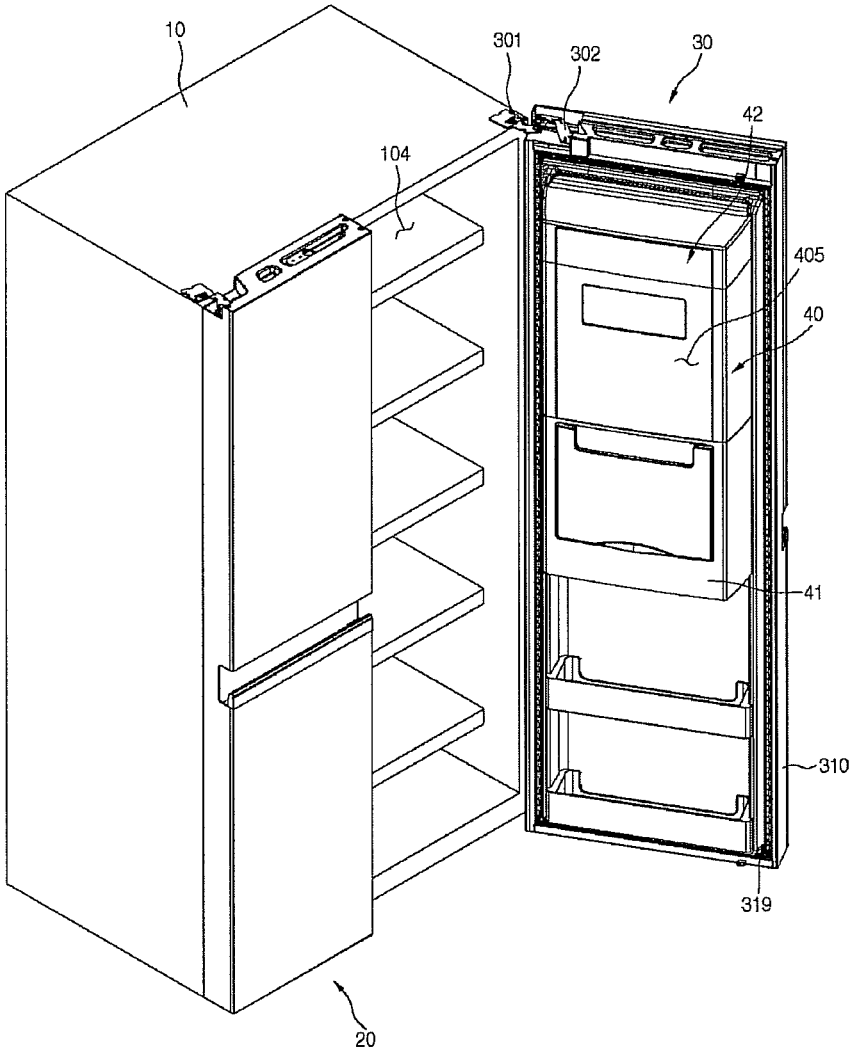


FIG. 3

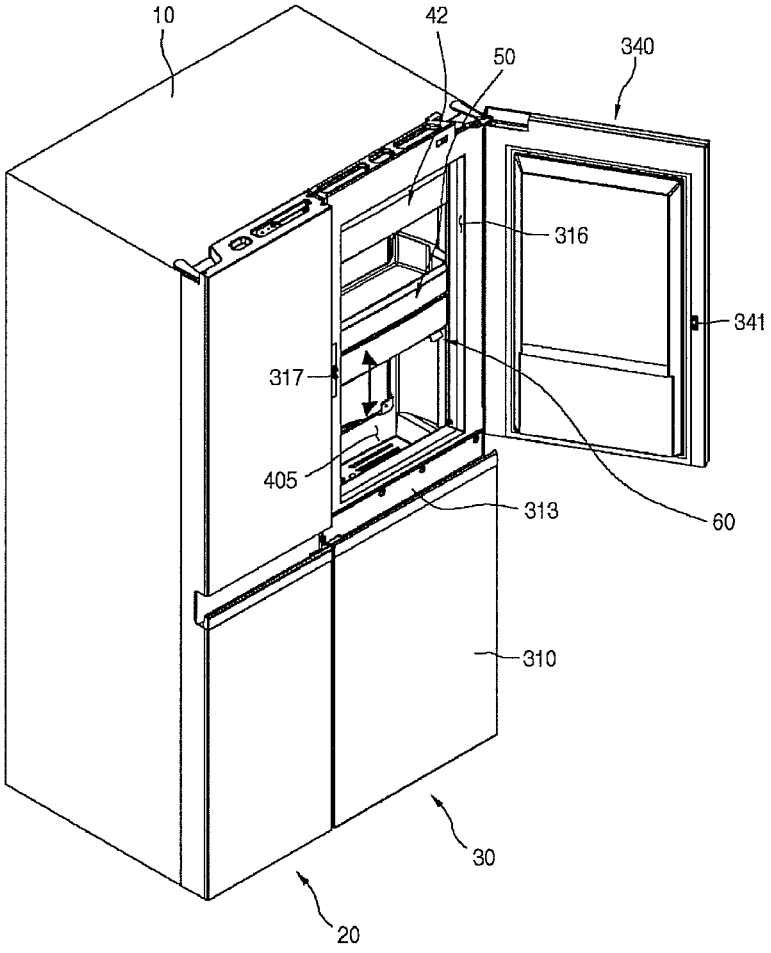


FIG. 4

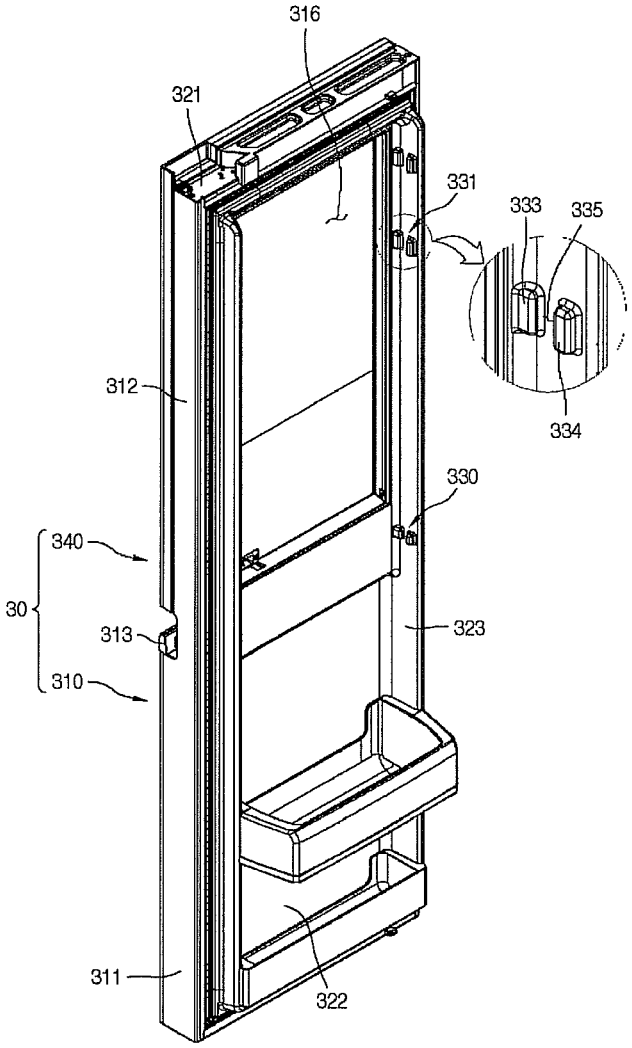


FIG. 5

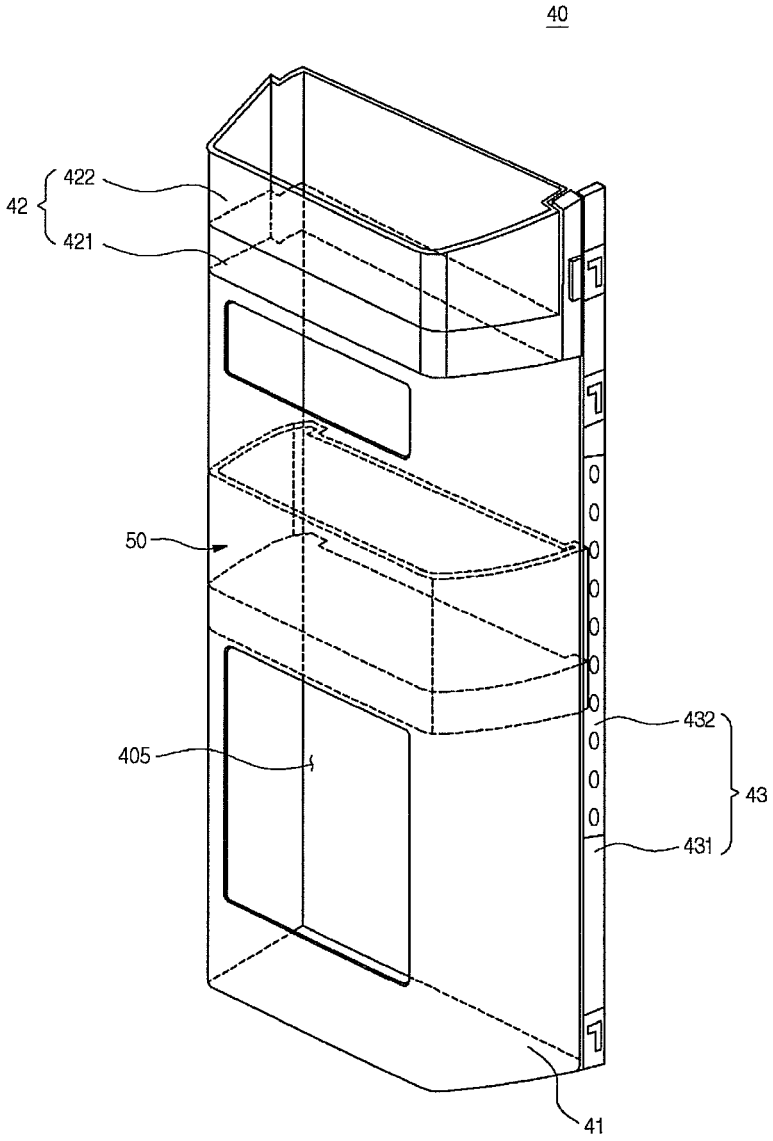


FIG. 6

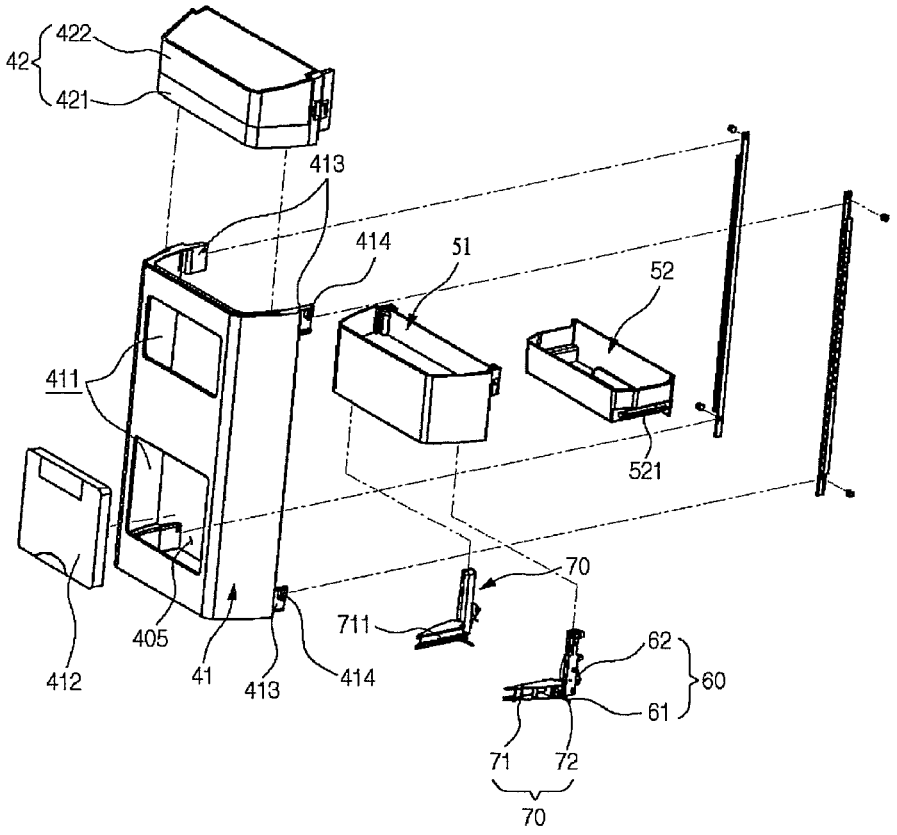

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FIG. 7

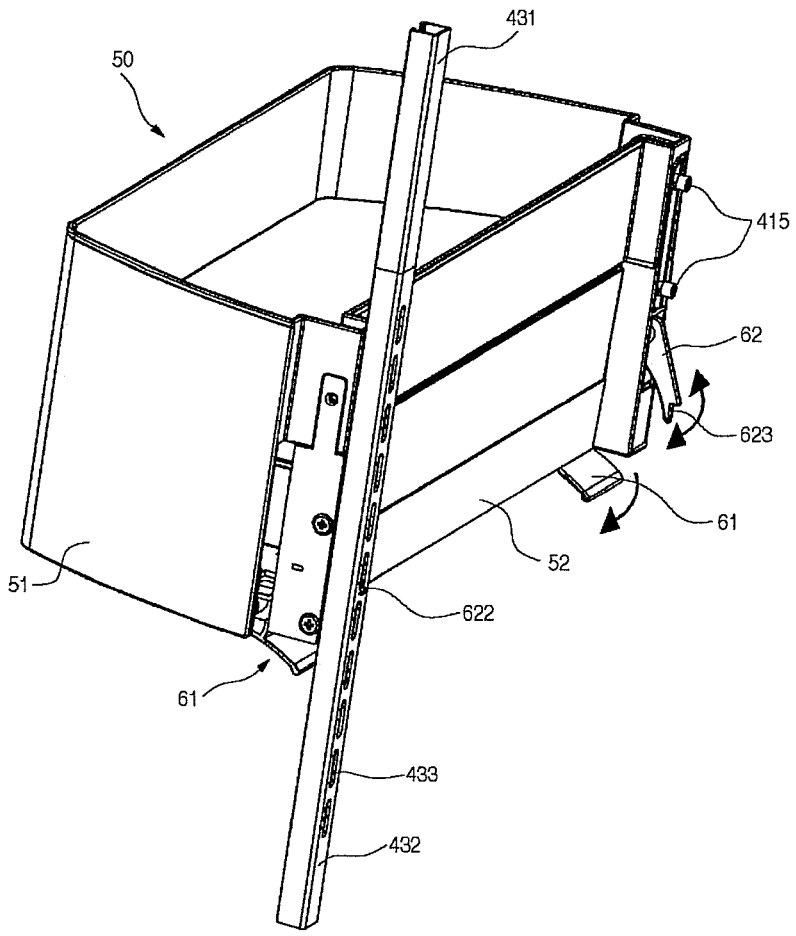

FIG. 8A

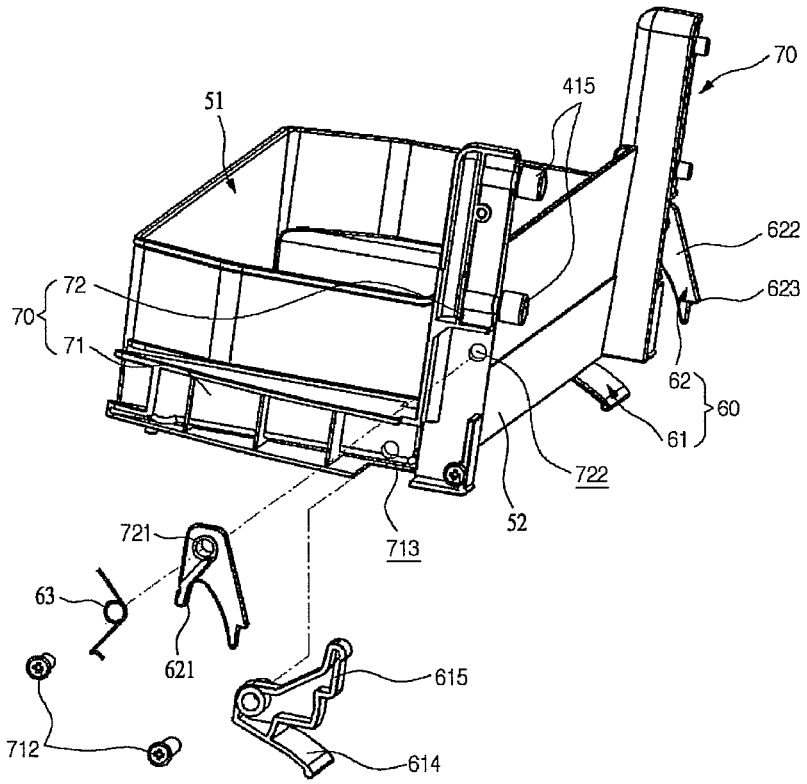
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FIG. 8B

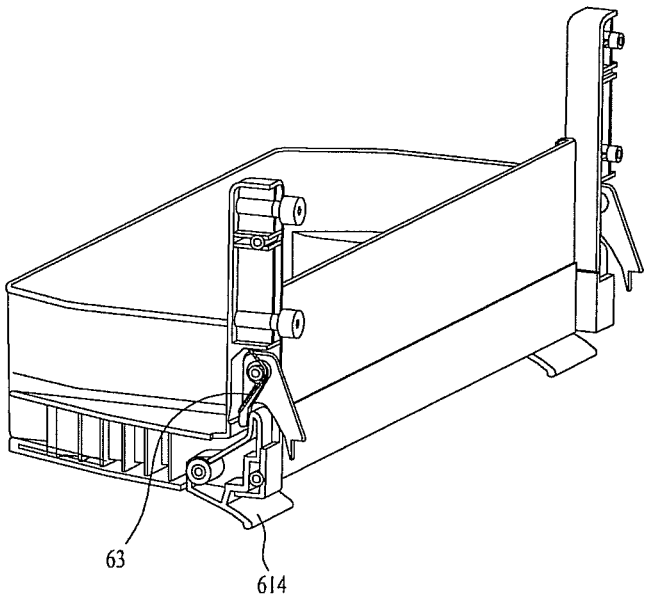

FIG. 9

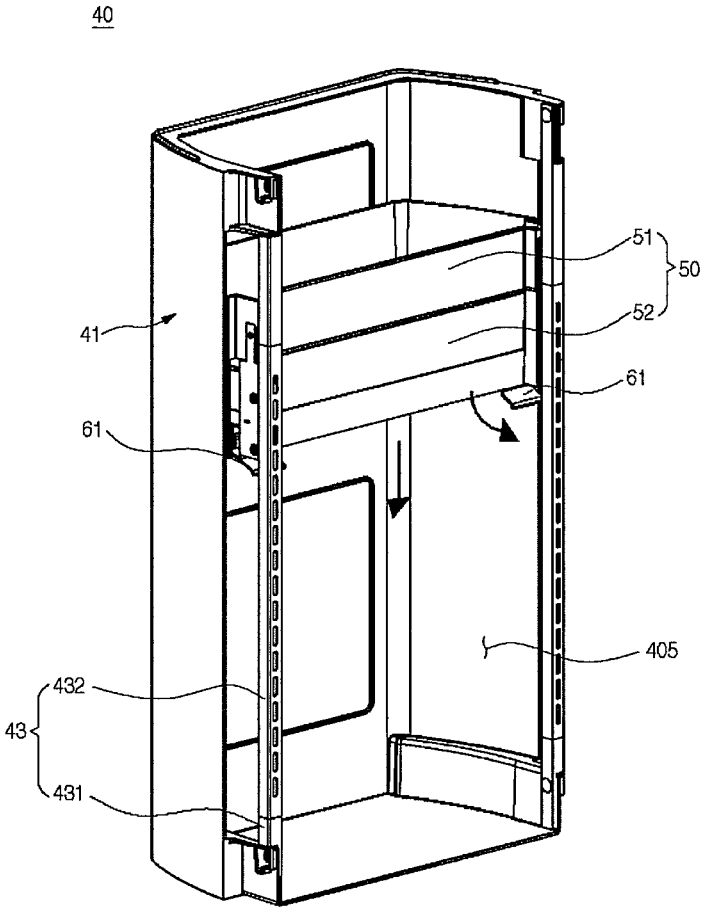

FIG. 10

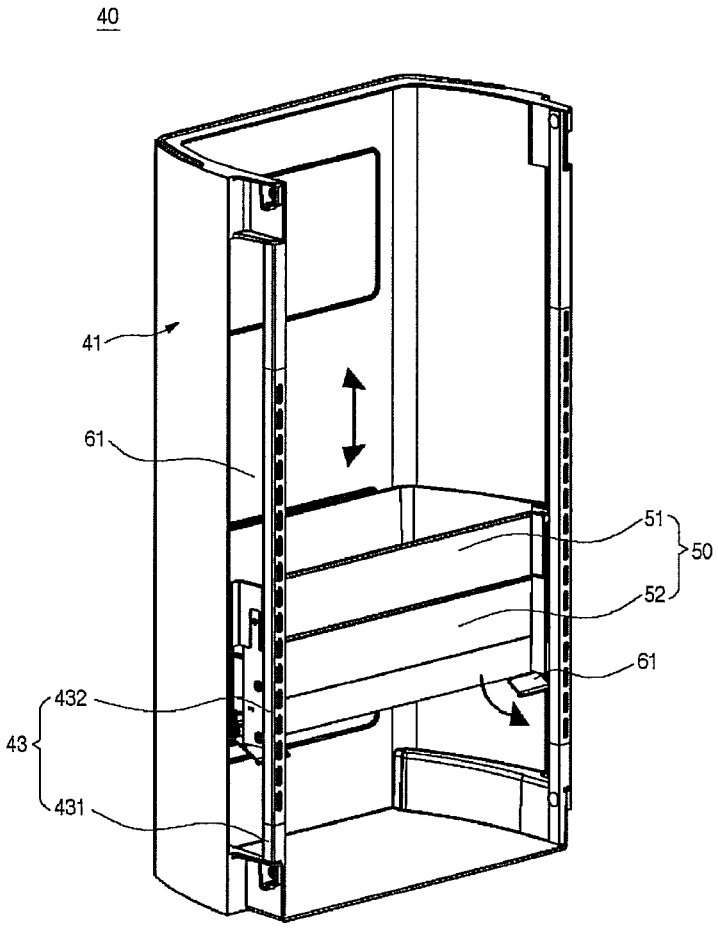

FIG. 11

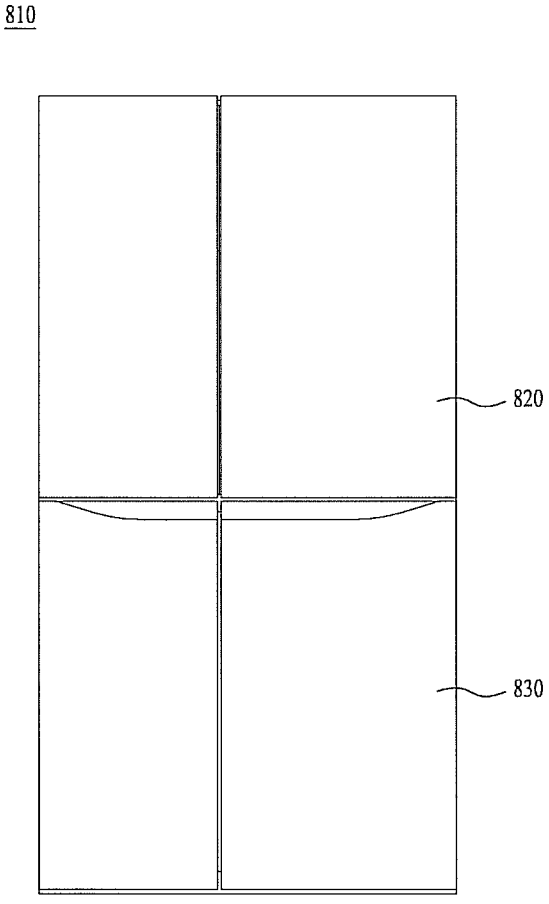

FIG. 12

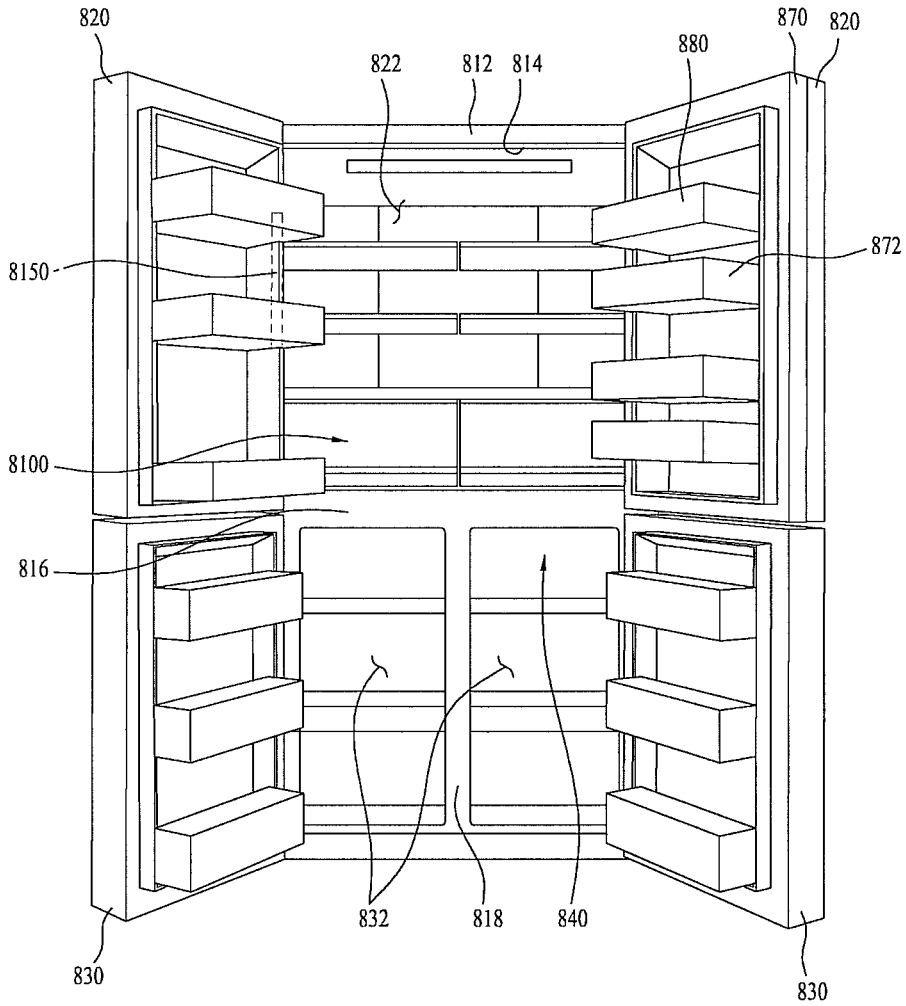
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FIG. 13

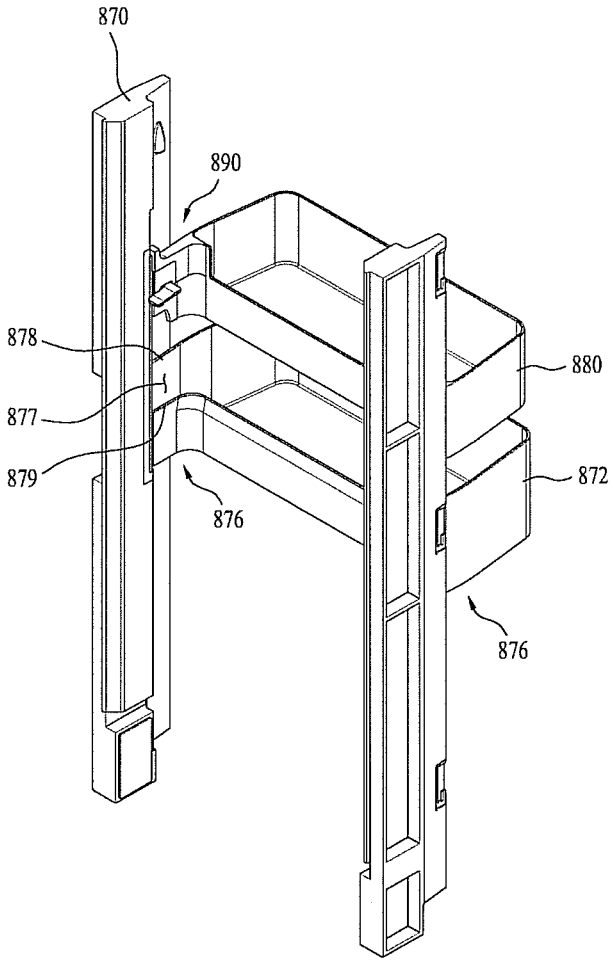


FIG. 14

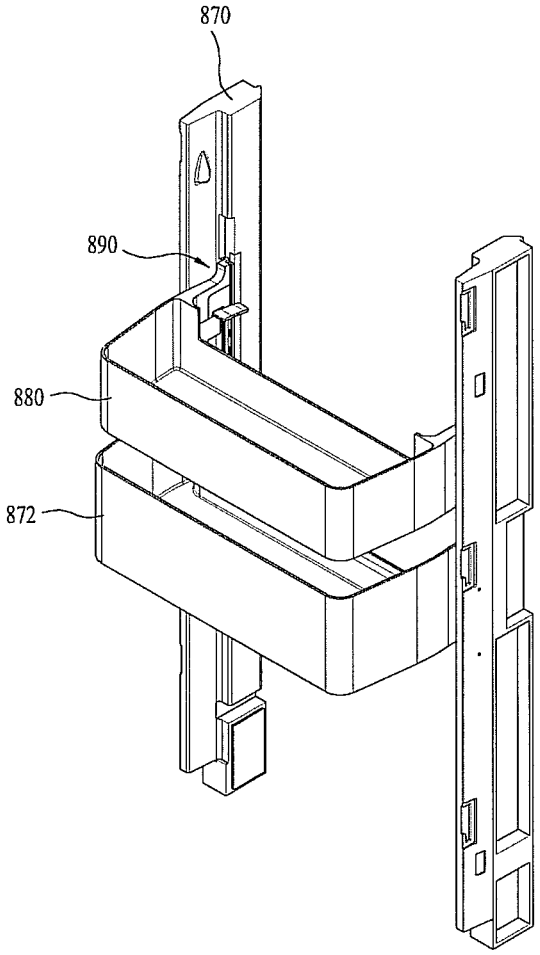


FIG. 15

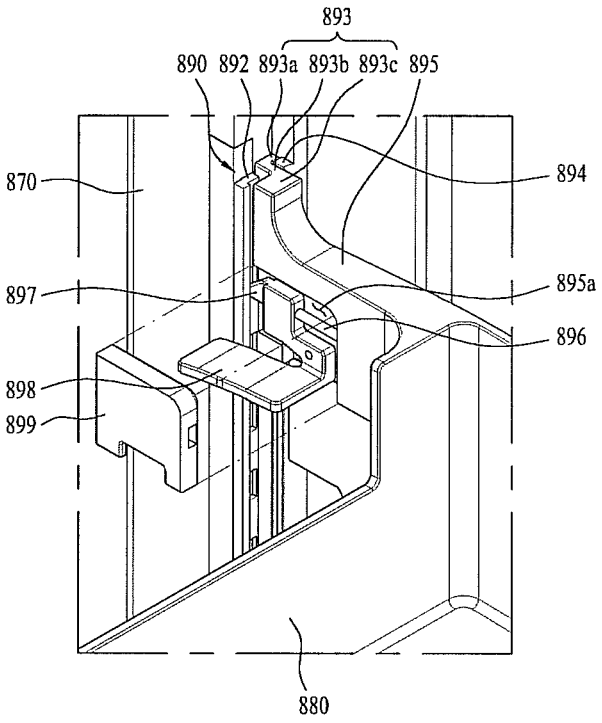


FIG. 16

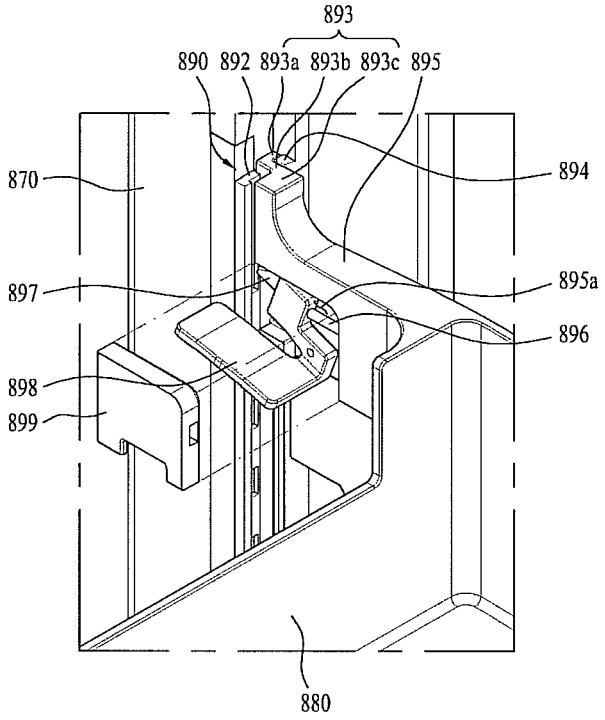


FIG. 17

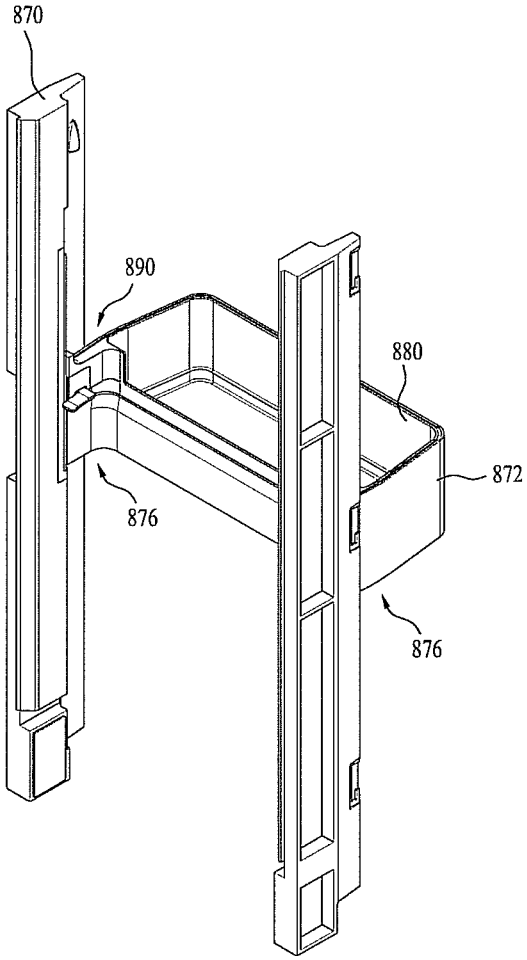


FIG. 18

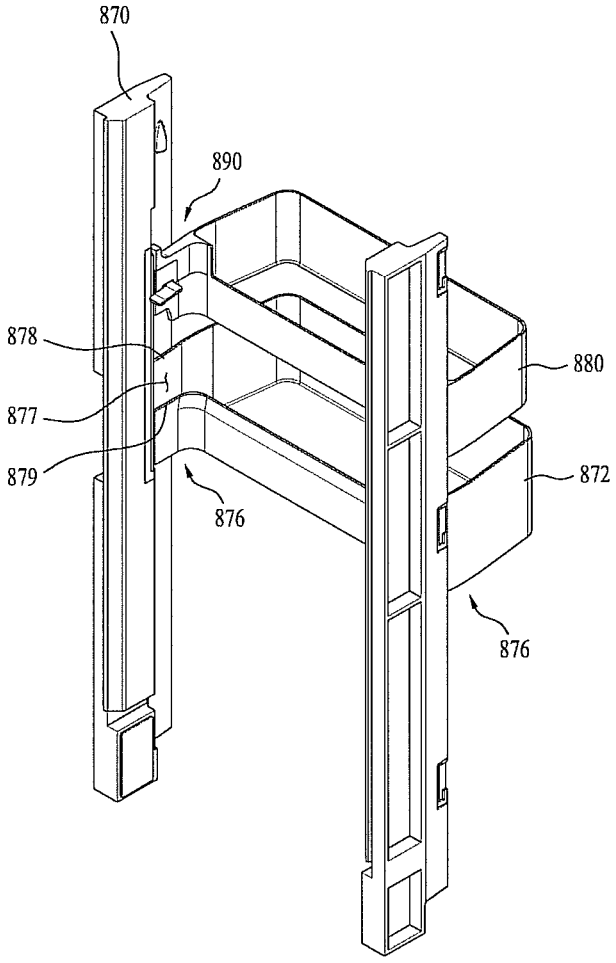
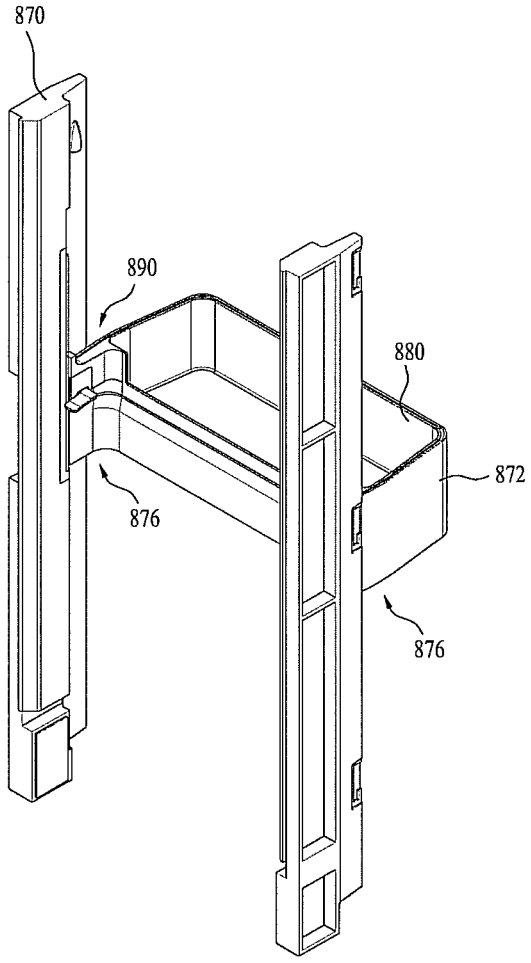


FIG. 19



REFRIGERATOR

CROSS-REFERENCE TO RELATED APPLICATION(S)

This application claims priority under 35 U.S.C. §119 from Korean Application Nos. 10-2011-0118955 filed on Nov. 15, 2011 and 10-2011-0120774 filed on Nov. 18, 2011, whose entire disclosures are hereby incorporated by reference.

BACKGROUND

1. Field

Embodiments as broadly described herein may relate to a refrigerator, and more particularly, to a refrigerator that may store items in an internal compartment, closable by an internal door.

2. Background

A refrigerator may store items at a temperature lowered by cold air generated by a freezing cycle including a compressor, a condenser, an expansion valve and an evaporator. Such a refrigerator may include a freezer compartment for storing items in a frozen state therein and a refrigerator compartment for storing items at a relatively low temperature. A Kimchi refrigerator may preserve items such as Kimchi and vegetables in a fresh state. One or more doors may be connected to a predetermined portion of a case of the refrigerator by a hinge to rotate to open and close a front of the case. Additionally, a drawer type door may be coupled to a front of a drawer that is slidably received in the case. A plurality of shelves may be provided in the various compartments.

BRIEF DESCRIPTION OF THE DRAWINGS

The embodiments will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:

Arrangements and embodiments may be described in detail with reference to the following drawings in which like reference numerals refer to like elements and wherein:

FIG. **1** is a perspective view of a refrigerator in accordance with one embodiment as broadly described herein;

FIG. **2** is a perspective view of the refrigerator shown in FIG. **1**, with a first storage chamber open;

FIG. **3** is a perspective view of the refrigerator shown in FIG. **1**, with a second storage chamber open;

FIG. **4** is a rear perspective view of a door of the refrigerator shown in FIG. **2**, with a storage assembly removed;

FIG. **5** is a perspective view of a storage assembly of the door of the refrigerator shown in FIG. **2**;

FIG. **6** is an exploded perspective view of the storage assembly shown in FIG. **5**;

FIG. **7** is a perspective view of a moving basket of the storage assembly, in accordance with an embodiment as broadly described herein;

FIG. **8**A is an exploded perspective view and FIG. **8**B is an assembled perspective view of a connection state of an operation device of the moving basket shown in FIG. **7**;

FIGS. **9** and **10** are perspective views illustrating a movement state of the moving basket shown in FIG. **7**;

FIG. **11** is a front view of a refrigerator in accordance with another embodiment as broadly described herein;

FIG. **12** is a front view of the refrigerator shown in FIG. **11**, with its doors open;

FIG. **13** is a front perspective view of a storage assembly of the refrigerator shown in FIGS. **11** and **12** in accordance with another embodiment;

FIG. **14** is a rear perspective view of the storage assembly shown in FIG. **13**;

FIGS. **15** and **16** illustrate a state in which a cover of the storage assembly shown in FIG. **13** is open;

FIG. **17** illustrates a state in which a sub-basket of the storage assembly shown in FIG. **13** is moved and overlapped with a top surface of a main-basket;

FIG. **18** is a perspective view of a modified example of the embodiment shown in FIG. **13**; and

FIG. **19** illustrates a state in which a sub-basket of the storage assembly as shown in FIG. **18** is moved and overlapped with a top surface of a main-basket.

DETAILED DESCRIPTION

Exemplary embodiments will be described in detail, referring to the accompanying drawings as follows.

Referring to FIGS. **1** to **3**, a refrigerator **1** as embodied and broadly described herein may include a cabinet **10** in which a storage chamber is formed and doors **20** and **30** for opening and closing the storage chamber. The storage chamber may include, for example, a freezer compartment **102** and a refrigerator compartment **104**, arranged, for example, side by side, and partitioned by a partition. The doors **20** and **30** may include a freezer door **20** for opening and closing the freezer compartment **102** and a refrigerator door **30** for opening and closing the refrigerator compartment **104**.

A storage assembly **40** may be provided on a rear (i.e., interior facing) surface of the refrigerator door **30**. The storage assembly **40** may include a storage case **41** detachably coupled to the rear surface of the refrigerator door **30**. In a state in which the refrigerator door **30** is closed against the refrigerator compartment **104**, the storage case **41** may be positioned in the refrigerator compartment **104**. In this embodiment, the refrigerator compartment **104** may be referred to as a first storage chamber and the space formed by the storage case **41** may be referred to as a second storage chamber **405**. Accordingly, the refrigerator door **30** may close the first storage chamber **104** and the second storage chamber **405** may then be positioned in the first storage chamber **104**.

The refrigerator door **30** may include a first door **310** for opening and closing the first storage chamber **104** and a second door **340** rotatably coupled to the first door **310** for opening and closing the second storage chamber **405**. The first and second doors **310** and **340** may be pivotally installed by a hinge assembly including a first hinge **301** for connecting the first door **310** to the cabinet **10** and a second hinge **302** for connecting the second door **340** to the first door **310**.

An opening **316** may be formed in the first door **310** to provide for access to the interior of the second storage chamber **405**. The size of the opening **316** formed in the first door **310** may correspond to the size of the open front face of the storage assembly **40**. Accordingly, when the second door **340** pivots with respect to the first door **310** while the first door **310** is in a closed position against the first storage chamber **104**, the opening **316** may be uncovered to provide access to the second storage chamber **405**.

A latch hook **341** may be provided at a rear surface of the second door **340** to couple and latch the second door to the first door **310**. A latch slot **317** may be formed in the first door **310** to couple the latch hook **341** thereto. The positions of the latch hook **341** and the latch slot **317** may be reversed.

When the first door **310** is closed against the first storage chamber **104** and the second door **340** is closed against the first door **310**, and a front surface of the second door **340** is pushed, the coupling between the latch hook **341** and the latch slot **317** may be released to allow the second door **340** to pivot and provide access to the second storage chamber **405**.

A seal **319** may be provided at the rear surface of the first door **310** to prevent outflow of cold air from the inside the first storage chamber **104**. A magnet may be provided in the seal **319** and the front surface of the cabinet **10** so that the magnetic attraction of the magnet may maintain the closed state of the first door **310** against the first storage chamber **104**.

A grip **313**, or handle, may be formed in the front surface of the refrigerator and freezer doors **30** and **20**. The grip **313** may be formed, for example, horizontally with respect to the refrigerator and freezer doors **30** and **20**, and may be, for example, pocket-shaped to be held by the user easily. The grips **313** formed in the refrigerator and freezer doors **30** and **20**, respectively, may be connected with each other for overall design uniformity.

The grips **313** may be positioned at an appropriate grasping height, such as, for example, approximately at a center of the overall height of the refrigerator and freezer doors **30** and **20**. The grips **313** may be positioned at a lower end of the opening, namely, a lower end of the second door **340**. Specifically, when closed, right and left ends of the second door **340** may be located at the same positions as right and left ends of the first door **310**. Upper and lower ends of the second door **340** may be positioned at the same positions as an upper end of the first door **310** and the grips **313**, respectively. Accordingly, as seen from the front in the state in which the second door **340** is closed, an outline of the second door **340** is not exposed. The second door **340** may be hidden by the shapes/contours of the first door **310** and the grips **313**. Such a visual effect may improve/enhance a front design of the refrigerator **1**. Other handle/grip arrangements may also be appropriate.

FIG. **4** is a perspective view of a rear, or interior facing, surface of the refrigerator door **30**, in a state in which a storage assembly according to an embodiment as broadly described herein has been detached.

As shown in FIG. **4**, a lateral surface of the first door **310** may be stepped. Specifically, the first door **310** may include a first portion **311** and a second portion **312** that extends upward from the first portion **311**. The second portion **312** may be thinner than the first portion **311** to at least partially accommodate the thickness of the second floor **340**. The opening **316** may be formed in the second portion **312** of the first door **310**, and the second door **340** may be connected with the second portion **312** to open and close the opening **316** and the second storage chamber **405**.

The grip **313** may be formed on the first portion **311** and may extend upward from an upper surface of the first portion **311**. To allow the user to grasp the grip **313**, the grip **313** may be spaced apart a predetermined distance from a front surface of the second portion **312** and a lower surface of the second door **340**. In other words, a vertical length of the second door **340** may be smaller than that of the second portion **312** to provide a space for access to the grip **313**. When the user pulls the grip **313**, the first door **310** may be pivoted to open the first storage chamber **104**.

The first door **310** may include an outer case **321** and a door liner **322** coupled to the outer case **321** and facing the interior of the first storage chamber **104** when the first door **310** is in the closed position. The door liner **322** may include a plurality of dikes **323** extending longitudinally in a vertical direction and spaced apart horizontally. A plurality of first couplers **330** and **331** may be arranged a predetermined distance apart in a vertical direction along the dikes **323**. The storage assembly **40** and the one or more baskets may be at least partially positioned between the dikes **323**.

Each of the first couplers **330** and **331** may include a first projection **333** and a second projection **334** spaced apart a predetermined distance from each other in a front-and-rear direction so that a predetermined space **335**, that is, a predetermined distance, is formed between the first projection **333** and the second projection **334**. The first projection **333** may be positioned adjacent to the opening **316** of the first door **310**. A distance between the first projection **333** and the opening **316** may be less than a distance between the second projection **334** and the opening **316**.

The storage assembly **40** may be mounted in a predetermined position on the rear surface of the first door **310**, corresponding to the opening **316**. The storage assembly **40** will be described in detail as follows, referring to FIG. **5**, which is a perspective view of the storage assembly, and FIG. **6**, which is an exploded perspective view of the storage assembly.

Referring to FIGS. **5** and **6**, the storage assembly **40** may include a storage case **41** and a plurality of baskets **42** and **50** arranged in the storage case **41** in a vertical direction, spaced apart a predetermined distance. The baskets **42** and **50** may be positioned in the storage case **41** to be accessible via the opening **316** when the second door **340** is open.

The plurality of baskets **42** and **50** may include, for example, an upper basket **42** and a moving basket **50** arranged below the upper basket **42**, the moving basket **50** being movable in a vertical direction.

The upper basket **42** may be arranged in an upper end area of the storage case **41** and may partially define an upper area of the storage case **41**. The upper basket **42** may be detachably provided in the storage case **41** and may include a basket tray **421** receiving storage items thereon and a basket cover **422** pivotally provided in the basket tray **421**. Accordingly, the upper basket **42** may be accessed by pivoting the basket cover **422** when the first door **310** is open. Such an upper basket **42** may be used as, for example, a dairy corner in which dairy items are stored.

The moving basket **50** may be mounted in a rail assembly **43** provided along right and left ends of the storage case **41**. The moving basket **50** may slide in a vertical direction in an inner space of the storage case **41** when mounted in the rail assembly **43**. The moving basket **50** may include an operation mechanism **60** that may selectively restrict operation of the storage case **41** and the rail assembly **43** to fix the moving basket **50** at a desired height. The structure of the moving basket **50** will be described in detail as follows.

The storage case **41** may form the second storage chamber **405** with the upper basket **42** fixed therein. The open front surface of the storage case **41** may correspond to the opening **316**.

The inner space of the storage case **41** may be divided into upper and lower spaces with respect to the moving basket **50**. Storage rooms may be formed in the upper and lower spaces divided with respect to the moving basket **50**. As the moving basket **50** moves, the distance between a bottom surface of the storage case **41** and the moving basket **50** may be adjusted and a space proportion inside the storage case **41** may be adjusted.

At least one cold air hole **411** may be formed in a rear surface of the storage case **41** to supply cold air to the inner

space of the storage case **41** from the interior of the refrigerator. A case door **412** may open and close the at least one cold air hole **411**.

A fixing part **413**, or fixing bracket **413**, may project forward from each front end of lateral surfaces of the storage case **41**. A plurality of fixing parts **413**, or fixing brackets **413**, may project forward from the right and left lateral surfaces, specifically, from upper and lower ends of each of the right and left lateral surfaces. A second coupler **414** may be formed in an outer surface of each fixing part **413** and may be coupled to the first couplers **330** and **331** to mount the storage case **41**.

Upper and lower ends of the rail assembly **43** may be connected with the fixing parts **413** formed in the upper and lower ends of the storage case **41**.

The rail assembly **43** may be positioned at a front end of the storage case **41** and may be arranged to connect to the fixing parts **413** positioned at the upper and lower ends of the storage case **41**. When mounting the storage case **41**, the rail assembly **43** may be arranged on the rear surface of the first door **310**. When viewed from the front of the first door **310**, the rail assembly **43** may be hidden and unseen.

In particular, the rail assembly **43** may be positioned at right and left sides of the storage case **41**, at an outside of the right and left ends of the opening **316**, so that the rail assembly **43** is covered by the opening **316** and not exposed via the opening **316** when viewed from the front.

The rail assembly **43** may be injection-molded of a plastic material. The rail assembly **43** may include a rail cover **431** connecting and extending between the fixing parts **413** and a rail **432** mounted on the rail cover **431**. The rail cover **431** may provide a mounting position of the rail **432** and couple the rail **432** thereto.

The rail **432** may be formed of metal and may enable the stable mounting of the moving basket **50**. The rail **432** may receive a roller **415** provided in the moving basket **50** to guide the movement of the moving basket **50** when the moving basket **50** is moving. The rail cover **431** and the rail **432** provided in the rail assembly may be integrally formed or they may be molded of one material as a single part.

A plurality of adjusting holes **433** may be formed along a longitudinal direction of the rail **432** and the operation mechanism **60** may be partially restricted by one of the adjusting holes **433** to fix the moving basket **50** at a desired height.

The operation mechanism **60** may be connected to a bottom of the moving basket **50** and may include an operation lever **61** and a restricting member **62** in communication with the operation lever **61**, such that the user may fix the moving basket **50** at a desired height according to the operation of the operation lever **61** exposed via the opening **316**.

The moving basket **50** may define a predetermined space that is recessed in a downward direction. The moving basket **50** may include a main-basket **51** moving along the rail **432** in a vertical direction and a drawer **52** provided underneath the main-basket **51**, the drawer **52** being slidable inward and outward with respect to the main-basket **51**. A guide member **70** may be provided on the main-basket **51** to guide the inward and outward sliding-movement of the drawer **52** and the operation mechanism **60** may be coupled to the guide member **70**.

The structure of the moving basket **50** and the operation mechanism **60** will now be described in detail with respect to FIGS. **7** and **8**A-**8**B.

As shown in FIGS. **7** and **8**A-**8**B, the recessed may be formed in the main-basket **51** and the drawer **52** may be positioned below main-basket **51**. The guide member **70** may be mounted on left and right lateral surfaces of the main-basket **51**. The drawer **52** may be coupled to the main basket **51** by the guide member **70** and may be movable outward (rightward, as shown in FIG. **7**) by the guide member **70**. Accordingly, the user may slide the drawer **52** outward via the opening **316** when the second door **340** is open. The drawer **52** may be completely accommodated in the lower area of the moving basket **50**, below the main-basket **51**, when it is moved inward.

The guide member **70** may be coupled to the right and left lateral surfaces of the main-basket **51**. The guide member **70** may include a guide **71** guiding the drawer **52** and an extension **72** extending perpendicular from a front end of the guide **71**. The guide **71** may include a guide groove **711** formed therein to receive a guide rib **521** of the drawer **52**. Outer surfaces of the guides **71** may be fixed to respective lateral surfaces of the main-basket **51**.

The extension **72** may extend from the front end of the guide **71** in an upward direction and may be exposed via right and left sides of the front surface of the storage case **41**. The extension **72** may extend to an upper end of the main-basket **51** and may include a pair of rollers **415**, spaced apart a predetermined vertical distance from each other, to enable stable vertical movement of the moving basket **50**.

The operation mechanism **60** may be coupled to the guide member **70** provided at each of right and left lateral surfaces of the main-basket **51**. The operation mechanism **60** may include the operation lever **61** and a restricting lever **62**. The operation lever **61** may be pivotally coupled to a first rotation projection **712** projected from the guide **71** and an operation tab **614**, operable by the user may be exposed through a first through-opening **713** of the guide **71**. The operation tab **614** may extend obliquely via the first through-part **713** in downward and forward directions, such that the user may push the operation tab **614** via the opening **316**.

A contacting part **615** of the operation lever **61** may extend upwardly to contact the restricting lever **62**. The contacting part **615** may press an activating part **621** of the restricting lever **62** when the operation lever **61** is pivoted.

The restricting lever **62** may be pivotally coupled to a second rotation projection **721** formed in the extension **72** of the guide member **70**. An elastic member **63** may be provided on the second rotation projection **721** to allow the activating part **621** to maintain contact with the contacting part **615**. The restricting lever **62** may be returned to an initial position by a restoring force of the elastic member **63** after it is rotated.

A restricting part **622** of the restricting lever **62** may extend at an incline in forward and downward directions. The restricting part **622** may pass through a second through-part **722** formed in the extension **72**. The restricting part **622** is extension **72** and be inserted in the rail **432** to fix the moving basket **50** in a particular position. A restricting groove **623** may be formed in an end of the restricting part **622** and hooked to a lower end of a selected adjusting hole **433** in the rail **432** to support the moving basket **50**.

Operation of the moving basket having the structure described above will now be described in detail.

Referring to FIGS. **9** and **10**, the second storage chamber **405** provided in the storage case **41** may be exposed via the opening **316** when the second door **340** is open relative to the first door **310**. The user may place items in the storage case **41** via the opening **316**.

The inner space of the storage case **41** may be partitioned into upper and lower spaces with respect to the moving basket **50**. Accordingly, the moving basket **50** may be moved

upward as shown in FIG. **9** to provide a lower space under the moving basket **50** that is sufficiently tall to accommodate relatively tall items in the lower space.

When tall items are stored in the main-basket **51**, the moving basket **50** may be moved downward as shown in FIG. **10** to provide a sufficiently tall upper space. The user may move the moving basket **50** to adjust a space proportion inside the storage case **41**.

The moving basket **50** is movable in up-and-down direction when mounted in the storage case **41**. To move the moving basket **50**, the operation mechanism **60** may be operated to selectively fix the moving basket **50** at a desired position. The operation lever **61** of the operation mechanism **60** may be exposed via the opening **316** when the second door **340** is open for manipulation by the user. The moving basket **50** may be fixed to a predetermined position on the rail **432** by the operation of the operation lever **61**. More specifically, when the moving basket **50** is secured at a predetermined position and the user pushes the operation lever **61**, the moving basket **50** may be released from and move vertically along the rail **432**.

In other words, when the operation lever **61** is pushed, the operation lever **61** is pivoted and the contacting part **615** pushes the activating part **621** of the restricting lever **62**, to pivot the restricting lever **62**. The restricting part **622** is released from the adjusting hole **433** by the rotation of the restricting lever **62** and restriction between the restricting lever **62** and the rail **432** is released. Accordingly, the moving basket **50** may be moved along the rail **432** smoothly by the rollers **415**.

After the user moves the moving basket **50** to a desired height, the user may remove the force applied to the operation lever **61** and the operation lever **61** may be restored by the elastic member **63**, with the restricting groove **623** at the end of the restricting part **622** fitted into a new adjusting hole **433** of the rail **432** at the new height.

When the second door **340** is open, the drawer **52** mounted in the moving basket **50** may be exposed via the opening **316** and the user may move the drawer **52** outward to store items in the drawer **52**.

After moving the moving basket **50** and/or the storing items in the second storage chamber **405** provided in the storage case **41**, the second door **340** may be closed to close the opening **316**.

FIG. **11** is a front view of a refrigerator according to another embodiment and FIG. **12** is a front view of the refrigerator shown in FIG. **11** with its door(s) open.

The refrigerator **810** shown in FIGS. **11** and **12** may include an outer case **812** for defining an overall exterior appearance, and an inner case **814** for defining a storage chamber in which items may be stored, namely, a freezer compartment **832** and a refrigerator compartment **822**. A predetermined space may be formed between the outer case **812** and the inner case **814** and a passage where cold air is circulated may be formed in the space.

The refrigerator **810** may include a freezer door **830** for opening and closing the freezer compartment **832** and a refrigerator door **820** for opening and closing the refrigerator compartment **822**. Ends of the freezer and refrigerator doors **830** and **820** may be pivotally coupled to the case of the refrigerator **810**, for example, by hinges. In certain embodiments, a plurality of freezer doors and refrigerator doors may be provided. That is, as shown in FIG. **12**, the refrigerator doors **820** and the freezer doors **830** may pivot forward from two opposite edges of the refrigerator **810**.

A barrier **816** may be installed between the freezer compartment **832** and the refrigerator compartment **822** to partition the storage chamber into the freezer compartment **832** and the refrigerator compartment **822**. The barrier **816** may have a predetermined thickness and may be formed in the inner case **814**. The barrier **816** may extend horizontally and the freezer compartment **832** and the refrigerator compartment **822** may be partitioned vertically with respect to the barrier **816**. Other arrangements may also be appropriate.

A partition wall **818** may also be installed in the freezer compartment **832** to partition the freezer compartment **832** into two partitioned spaces. The partition wall **818** may be vertically installed in the inner case **814** to form two side by side partitioned freezer compartments **832**. Accordingly, the freezer doors **830** may open or close the freezer compartments separately.

In the exemplary refrigerator **810** shown in FIGS. **11** and **12**, the refrigerator compartment **822** does not include a partition wall to partition the refrigerator compartment **822** into right and left spaces. However, a partition wall similar to the partition wall **818** provided in the freezer compartment **832** may be installed in the refrigerator compartment.

An inner door **870** may be installed in the refrigerator door **820** (that is, one or both of the refrigerator doors **820**). The inner door **870** may be installed each of the two refrigerator doors **820** or it may be installed only in one of the refrigerator doors **820** as shown in FIG. **12**. In certain embodiments, the inner door **870** may be installed on one or more of the freezer doors **830**. The inner door **870** may be closer to the refrigerator compartment **822** than the refrigerator door **820**. Accordingly, when the user opens only the refrigerator door **820** while the inner door **870** remains closed, the user may access items stored in a storage chamber provided in the inner door **870**.

In certain embodiments, a shelf, a drawer, a basket and the like may be arranged in each of the freezer and refrigerator compartments **832** and **822**. One or more drawers **840** movable inward and outward may be installed in the freezer compartment **832** and items may be stored in the drawer **840**. A cover may be arranged on a front surface of the drawer **840** to preserve cold air in the freezer compartment **832** even when the freezer door **830** is open. A plurality of drawers **840** may be arranged in the freezer compartment **832** and the plurality of the drawers **840** may be arranged side by side with respect to the partition wall **818**, and vertically along each side of the partition wall **818**.

Auxiliary baskets **880** may be pivotally coupled to the inner door **870**. Both ends of the auxiliary basket **880** may be fixed to the inner door **870** and a lower surface of the auxiliary basket **880** may be open. Accordingly, when the auxiliary basket **880** is moved upwardly, tall items may be stored in the auxiliary basket **880**. When the auxiliary basket **880** is moved downwardly, smaller items may be stored in the auxiliary basket **880**.

Meanwhile, a main-basket **872** may be fixed in the inner door **870** and arranged below the auxiliary basket **880**, such that the main-basket **870** may be overlapped with or spaced apart a predetermined distance from the auxiliary basket **880** as the auxiliary basket **880** is moved.

A light source **8150** may be installed in the freezer compartment **832** and/or the refrigerator compartment **822** to irradiate light. When the user opens the freezer door **830** or the refrigerator door **820**, the light source **8150** may be put into operation. The light source **8150** may emit light toward a rear area of the freezer compartment **832** and/or the refrigerator compartment **822** (i.e., an interior area of the freezer and/or refrigerator compartment).

FIG. **13** is a partial perspective view of the refrigerator shown in FIGS. **11** and **12**, as seen from the front, and FIG. **14** is a partial perspective view, as seen from the rear.

In this embodiment the refrigerator may include an inner door **870** pivotally installed in a refrigerator door **820** or freezer door **830** and a main-basket **872** and an auxiliary basket **880** coupled to the inner door **870**. In FIGS. **13** and **14**, only two lateral frames of the inner door **870** are cut-away and illustrated, simply for ease of explanation and illustration. A side of the inner door **870** may be arranged adjacent to the pivoting hinge of the refrigerator door **820** or the freezer door **830** to enable the inner door **870** to pivot on the same axis as the refrigerator door **820** or the freezer door **830**.

Although FIG. **12** shows that the inner door **870** is installed in the refrigerator door **820**, it is well understood that the inner door may also installed in the freezer door **830** in a similar manner. Thus, the configuration of the inner door **870** installed in the refrigerator door **830** will not be described separately.

Also, for ease of explanation, the freezer and refrigerator doors **830** and **820** will hereafter be referred to as an outer door.

The main-basket **872** may be fixed in the inner door **870**, without being adjustable in height/installation position. In contrast, the auxiliary basket **880** may be movably installed in the inner door **870** in a vertical direction.

A first fixing part **890** may couple the auxiliary basket **880** to the inner door **870** and a second fixing part **876** may couple the main-basket **872** to the inner door **870**. The first fixing part **890** may allow the auxiliary basket **880** to move vertically with respect to the inner door **870** and the second fixing part **876** may fix the main-basket **872** at a predetermined position on the inner door **870**.

The first fixing part **890** may connect two opposite ends of the auxiliary basket **880** to the inner door **870**. Accordingly, two first fixing parts **890** may be formed in a predetermined shape corresponding to the two opposite ends of the auxiliary basket **880**.

In certain embodiments, the first fixing part **890** may be arranged in front of a storage space formed in the auxiliary basket **880**. The storage space may refer to an inner space of the auxiliary basket **880** that is approximately a rectangular parallelepiped, with an open top, so that items may be placed in or taken out via the open top.

Arranging the first fixing part **890** in front of the storage space allows the user to move the auxiliary basket **880** along an upward and downward direction easily, seeing the inner door **870**, while not having to actually open the inner door **870**.

In other words, when the user opens only the outer door, and not the inner door **870**, the user may see the first fixing part **890** arranged in front and the storage space of the auxiliary basket **880** arranged behind the first fixing part **890** (in a direction in which the user views the freezer or refrigerator compartment from the outside).

The second fixing part **876** may include an accommodation space **877** for partially accommodating the first fixing part **890**. The accommodation space **877** may have an approximately rectangular-parallelepiped-shape, as shown in FIG. **13**.

The second fixing part **876** may include a first fixing piece **878** and a second fixing piece **879** each having a plate shape to separately connect the main-basket **872** to the inner door **870**. Accordingly, the accommodation space **877** may be formed between the first fixing piece **878** and the second fixing piece **879**, which may be spaced apart a predetermined distance from each other as shown in FIG. **13**.

In certain embodiments, the height of the first fixing piece **878** may be different from that of the second fixing piece **879**. For example, the first fixing piece **878** may be installed at an outside of the second fixing piece **879** and the first fixing piece **878** may be higher than the second fixing piece. The first fixing part **890** may include various components, projected inwardly, which may limit the moving range of the auxiliary basket **880** as it moves toward the top surface of the main-basket **872**. In other words, the height of the second fixing piece **879** may be less than that of the first fixing piece **878**, due to the limitation of the inwardly projected components provided in the first fixing part **890**.

Like the first fixing part **890**, a pair of second fixing parts **876** may connect two opposite ends of the main-basket **872** to the inner door **870**. Accordingly, two second fixing parts **876** may be provided in symmetry with the two opposite ends of the main-basket **872**.

In certain embodiments the auxiliary basket **880** may extend beyond the main-basket **872**, and the sub-basket **880** may move downwardly to the same height as the main-basket **872**. As the auxiliary basket **880** is connected to the inner door **870** by the first fixing part **890** and the main-basket **872** is connected to the inner door **870** by the second fixing part **876**, the auxiliary basket **880** cannot move below the main-basket **872**.

Rather, in certain embodiments, the lowest height of the auxiliary basket **880** moving downwardly may be to the position of the main-basket **872**. When the auxiliary basket **880** is moved to the lowest limit, the bottom surface of the auxiliary basket **880** may contact the bottom surface of the main-basket **872**, such that the main-basket **872** and the auxiliary basket **880** overlap each other, and the auxiliary basket **880** is essentially nested within the main basket **872**.

Items with a high frequency of use such as, for example, water and other beverages, various healthy foods or side dishes may be stored in the main-basket **872** that forms the storage space of the inner door **870**. Accordingly, when storing items such as tall beverage bottles, the auxiliary basket **880** may be moved vertically so that the main-basket **872** and the auxiliary basket **880** may be overlapped with each other to accommodate the tall item. When storing short items such as side dishes, the auxiliary basket **880** may be moved upward and two shelves may be installed to store various items.

Bottom surfaces of the auxiliary basket **880** and the main-basket **872** may be closed so that, when they overlap as shown in FIG. **17**, the storage space formed by the auxiliary basket **880** and the storage space formed by the main-basket **872** correspond with each other and items may be substantially placed only in the auxiliary basket **880**.

In this instance, when the auxiliary basket **880** and the main-basket **872** are overlapped with each other (i.e., the auxiliary basket **880** is positioned within the main basket **872**) as shown in FIG. **17**, a single storage space may be formed.

In contrast, when the auxiliary basket **880** and the main-basket **872** are spaced apart from each other, items may be stored in the auxiliary basket **880** and the main-basket **872** independently.

FIGS. **15** and **16** illustrate a first coupling part in detail, with the cover open. FIG. **15** shows a hook engaged in a groove of a first guide member and FIG. **16** shows the hook pivoted in a clockwise direction and not engaged the groove of the first guide member.

The first fixing part **890** may include a first guide member **892** and a second guide member **894** installed on the inner door **870**, and a movable member **893** that is movable between the first guide member **892** and the second guide member **894**. The movable member **893** may be installed in the auxiliary basket **880**, different from the first guide member **892** and the second guide member **894**.

The first guide member **892** and the second guide member **894** may extend longitudinally along a vertical surface of the inner door **870**. The auxiliary basket **880** may be movable to a predetermined extendible range of the first and second guide members **892** and **894**.

The movable member **893** may include a supporting piece **893***b* having two sides supported by the first and second guide members **894**, respectively. The supporting piece **893***b* may ascend/descend vertically between the first and second guide members **892** and **894** in the space formed between the first and second guide members **892** and **894**. The supporting piece **893***b* may be formed in a rectangular bar shape to enable the sides thereof to maintain surface contact with and be supported by the first and second guide members **892** and **894**.

A first bent piece **893***a* may extend toward the second guide member **894** from an end of the supporting piece **893***a* and a second bent piece **893***b* may extend toward the first guide member from the other end of the supporting piece **893***b*. The first bent piece **893***a* and the second bent piece **893***c* may extend in opposite directions from different positions so that the first bent piece **893***a*, the supporting piece **893***b* and the second bent piece **893***c* may form a

shape. The first bent piece **893***a* and the second bent piece **893***c* may extend in different directions with respect to the supporting piece **893***b*, providing for the stable coupling of the supporting piece **893***b* between the first guide member **892** and the second guide member **894**.

The first guide member **892** may be, for example, a rack having a plurality of grooves formed therein. The plurality of the grooves may be formed in the first guide member **892** linearly, spaced apart a predetermined distance from each other, and the first guide member **892** may extend longitudinally in a vertical direction of the inner door **870**.

An extended piece **895** may be provided in a connecting portion between the second bent piece **893***c* and the auxiliary basket **880** to space the auxiliary basket **880** apart a predetermined distance from the extended piece **895**. A recessed part **895***a* may be formed as a recess in the extended piece **895** having a predetermined depth and a cover **899** may cover the recessed part **895***a*. The recessed part **895***a* may be formed adjacent to a portion facing the first guide member **892** or to the second bent piece **893***c*. A hook **897** may be installed in the recessed part **895***a* to be securely hooked to one of the grooves.

An elastic member **896** may be provided at an end of the hook **897** to elastically support the hook **897** coupled by a pivot. The elastic member **896** may have a restoring force with respect to a compressive force. When the user rotates the hook **897** in a clockwise direction in the state shown in FIG. **15**, the elastic member **896** may be compressed as shown in FIG. **16** and the hook **897** may be rotated in a clockwise direction. Once the force applied by the user is removed, the hook **897** may be rotated in a counter-clockwise direction by the restoring force of the elastic member **896** as shown in FIG. **15**.

When the elastic member **896** is compressed sufficiently as shown in FIG. **15**, the hook **897** may be inserted in one of the grooves provided in the first guide member **892** and the position of the auxiliary basket **880** may be fixed. In contrast, to change the position of the auxiliary basket **880** the user may rotate the hook **897** in a clock-wise direction and the hook **897** may be detached from the groove, to adjust the auxiliary basket **880** to a desired height.

Different from what is shown in FIG. **15**, the elastic member **896** may be a leaf spring or coil spring that is able to generate a restoring force with respect to a compressive force.

A seating protrusion may be formed opposite the elastic member **896** with respect to the hook **897**, to limit a rotational passage of the hook **897**. The seating protrusion may have a surface that is able to maintain surface-contact with the hook **897**. When the hook **897** is contacting the seating protrusion, the counter-clockwise direction rotation of the hook **897** is limited and the hook **897** is stopped. In other words, the hook **897** would be rotated in the counter-clockwise direction by the restoring force of the elastic member **896** continuously. However, the hook **897** is not rotated in the counter-clockwise direction a predetermined angle or more, because of the seating protrusion.

The first fixing part **890** may also include an operation piece **898** for rotating the hook **897** about the axis. The operating piece **898** may extend from the hook **897** and the user may hold and move the operating piece **898** to rotate the hook **897**.

The operating piece **898** may be exposed to provide access to the user even when the cover **899** is installed. The user may operate the operating piece **898** in a state in which the cover **899** closes the recessed part **895***a*, which may improve user convenience.

The cover **899** may extend across the recessed part **895***a* to prevent the hook **897** and the elastic member **896** from being exposed to the outside.

FIG. **18** is a perspective view of a modification the embodiment shown in FIGS. **13** to **17**, seen from the front. FIG. **19** illustrates a state in which an auxiliary basket shown in FIG. **18** is moved to a top surface of a main-basket to be overlapped with, or contained within the confines of, the main-basket.

In the embodiment shown in FIGS. **18** and **19**, a bottom surface of the auxiliary basket **880** is open, different from the embodiment shown in FIGS. **13** to **17** described above. Other components of this embodiment are the same as or similar to the corresponding components of the embodiment described above, except the shape of the auxiliary basket **880**. The bottom surface of the main-basket **872** is closed in this embodiment, similar to the embodiment described above.

When the bottom surface of the auxiliary basket **880** is open, the height of the auxiliary basket **880** may be adjusted and the items stored in the main-basket **872** may be stored stably. When the items stored in the main-basket **872** are tall bottles such as beverage bottles and the tall bottles are accommodated only in the main-basket, the bottles may shake or move out of the main-basket **872**. In this instance, when the auxiliary basket **880** is moved upwardly from the main-basket **872**, a middle area of a beverage bottle may be supported by the auxiliary basket **880** and the beverage bottle may be prevented from falling from the inner door **870**.

In contrast, when the beverage bottle stored in the main-basket **872** is taken out, the auxiliary basket **880** may be moved downwardly and then the beverage bottle may be taken out of the main-basket **872**. When the auxiliary basket **880** is moved downwardly, the exposed space of the bottle

may be increased and the bottle may be more easily accessible. The structure of the auxiliary basket **880** that generates the upward and downward movement is essentially the same as the structure of the auxiliary basket according to the embodiment described above.

In other words, in this embodiment, the auxiliary basket **880** may be accommodated in the main-basket **872** and overlap the main-basket. In this instance, the structure shown in FIG. **19** is formed.

A refrigerator is provided including a moving basket provided in a first door, the moving basket being vertically movable in a storage assembly opened and closed by a second door, with an adjustable height by an operation device, to utilize an internal space of the storage assembly efficiently.

A refrigerator is provided that is able to utilize a predetermined space installed in an internal door provided in a freezer or refrigerator compartment.

A refrigerator as embodied and broadly described herein may include a cabinet for defining a first storage chamber; a first door for opening and closing the first storage chamber; a storage case coupled to the first door, the storage case for defining a second storage chamber to store foods therein; an opening formed through the first door, in communication with an open front of the second storage chamber; a second door for opening and closing the second storage chamber, connected with the first door; a moving basket provided in the storage case, the moving basket that is movable along the storage case in a vertical direction; a rail provided in the second storage chamber, the rail extended in a vertical direction to guide the movement of the moving basket; and an operation mechanism provided in the moving basket to enable the moving basket to be restricted to the rail by a user's operation, wherein the operation mechanism is partially exposed via the opening to be operated by the user after the user opens the second door.

The moving basket may partition an inner space of the storage case into upper and lower spaces.

A plurality of rails may be provided in right and left sides of the storage case.

The rail may be arranged closer to the right and left sides than the opening and it may be hidden by both sides of the opening, see in the front.

The rail may be provided in a front end of the storage case, corresponding to a rear surface of the first door.

A roller may be accommodated in the rail in the moving basket.

The operation mechanism may be provided in each of the sides of the moving basket corresponding to the rail. The operation mechanism may include an operation lever provided in the moving basket, the operation lever rotated by the user's operation; a restricting member rotated in communication with the rotation of the operation lever, the restricting member inserted in a plurality of adjusting grooves formed in the rail to restrict the moving basket; and an elastic member provided in the restricting member, the elastic member restituted to an initial position after the restricting member or the operation lever is operated.

The moving basket may include a drawer installed via the opening; and a guide member for guiding inward and outward movement of the drawer.

The moving basket may include a moving main-basket for partitioning an inner space of the storage case, the moving main-basket in which foods are accommodated; a drawer accommodated in the moving main-basket, the drawer movable outwardly with respect to the opening; and a guide member coupled to the moving main-basket, the guide member for guiding the inward and outward sliding movement of the drawer.

A plurality of adjusting grooves may be formed in the rail, spaced apart a predetermined distance from each other in a vertical direction and an operation mechanism may be provided in the guide member. The operation mechanism may be inserted in the adjusting groove by the user's operation to fix the moving basket.

A roller may be provided in the guide member to be inserted in the rail to guide the movement of the moving basket.

An upper basket may be provided in the storage case to open and close a top surface of the storage case and the upper basket may be open toward the opening to provide a storage space independent from the second storage chamber.

The upper basket may include a basket tray mounted in the storage case, the basket tray for defining a storage space where foods are stored; and a basket cover pivotally coupled to the basket tray, the basket cover for opening and closing the storage space of the basket tray.

The upper basket cover may be rotated in a state where the first door is open.

In another embodiment as broadly described herein, a refrigerator may include an inner door pivotally mounted in an outer door for opening and closing a freezer compartment or a refrigerator compartment; a sub-basket coupled to the inner door, with being movable vertically; a first fixing part for fixing the sub-basket to the inner door, wherein the first fixing part includes a first guide member and a second guide member installed in the inner door and a movable member movably provided between the first guide member and the second guide member, and the first fixing part is arranged in front of a storage space provided in the sub-basket to store foods therein,

The movable member may include a supporting piece comprising both sides supported by the first guide member and the second guide member, respectively; and a first bent piece extended toward the second guide member from the supporting piece.

The movable member may further include a second bent piece extended toward the first guide member from the supporting piece.

The first guide member may be a rack having a plurality of grooves formed therein, and a hook may be installed in the movable member to be hooked to one of the plurality of the grooves.

The refrigerator may further include a main-basket fixed to the inner door; and a second fixing part for fixing the main-basket to the inner door, wherein the main-basket may be installed below the sub-basket and an accommodation space may be provided in the second fixing part to accommodate the movable member.

The second fixing part may include a first fixing piece and a second fixing piece for connecting the main-basket to the inner door, and the accommodation space may be a predetermined space formed between the first fixing piece and the second fixing piece spaced apart from each other.

The sub-basket may be movable downwardly to the same height as the main-basket.

The sub-basket and the main-basket may be overlapped with each other when the sub-basket is moved downwardly to the same height as the main-basket.

A bottom surface of the sub-basket may be open.

In a refrigerator as embodied and broadly described herein, the moving basket accessible to the inside of the storage case when the second door is open may be movable

vertically in the storage case so that a height proportion of the upper and lower spaces with respect to the moving basket in the storage case may be adjusted.

As a result, the user may adjust the inner space of the second storage chamber provided in the storage case appropriately to store various foods having various heights. Accordingly, space efficiency and a storage ability may be enhanced.

Furthermore, as the moving basket may be movable along the rail provided in the storage case and it may be movable vertically in the storage case, the storage space may be adjusted freely in a state in which foods are stored in the second storage chamber.

Additionally, as the rail for guiding the vertical movement of the moving basket may be provided in the front end of the storage case, outside of the opening and not exposed to the outside when the second door is open, the inner structure of the storage case may be simplified and storage space may be maximized. Still further, the storage space may be adjustable while the moving basket is mounted, without having to detach the moving basket for adjustment. The operation mechanism may be exposed via the opening when the second door is open and the user may operate the operation mechanism via the opening, so that the vertical height of the moving basket may be easily adjusted. As a result, the user can move the moving basket in a vertical direction more conveniently and adjust the space of the second storage chamber.

Any reference in this specification to "one embodiment," "an embodiment," "example embodiment," etc., means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the invention. The appearances of such phrases in various places in the specification are not necessarily all referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with any embodiment, it is submitted that it is within the purview of one skilled in the art to effect such feature, structure, or characteristic in connection with other ones of the embodiments.

Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

What is claimed is:

1. A refrigerator comprising:

a cabinet that defines a first storage chamber; and

a main door coupled to the cabinet, wherein the main door includes:

a first door having an outer portion defined to be opposite the cabinet and an inner portion defined to be opposite the outer portion, and an opening that passes through the inner portion and the outer portion:

a storage case coupled to an interior side of the first door, that defines a second storage chamber, wherein the opening, which is formed through the first door, is in communication with an open front of the second storage chamber;

a first basket coupled to the first door so as to be vertically movable, the first basket having a storage space to receive and store food therein, wherein the first basket, which is provided in the storage case, is vertically movable within the storage case;

an operating portion configured to vertically move the first basket;

a coupling portion configured to couple the first basket to the first door, wherein the coupling portion is provided at the outer portion of the first door, wherein the coupling portion maintains a distance between the first basket and the first door constant while the first basket moves vertically, wherein the operation portion is positioned closer to a user than the storage space of the first basket such that the user operates the operating portion by passing through the opening, but not passing through the storage space of the first basket, wherein the coupling portion is positioned closer to a user than the storage space of the first basket such that the operation portion and the coupling portion are connected to each other at an outer portion of the storage space of the first basket without passing through the storage space of the first basket;

a second door coupled to the first door at a position corresponding to the open front of the second storage chamber to open and close the second storage chamber; and

at least one rail that extends vertically in the second storage chamber to guide movement of the first basket, wherein, in a first mode of the main door, the first storage chamber is accessible using the first door and the second storage chamber is inaccessible, and in a second mode of the main door, the second storage chamber is accessible using the second door and the first storage chamber is inaccessible, and wherein the operation portion is partially exposed via the opening in the first door such that a user can operate the operation portion via the opening in the first door when the second door is rotated away from the first door in the second mode, wherein the first basket includes:

a moving basket, in which storage items are received;

a drawer slidably coupled at a bottom of the moving basket and movable inwardly and outwardly via the opening in the first door; and

a guide member that guides the inward and outward movement of the drawer.

2. The refrigerator of claim **1**, wherein in a third mode of the main door, the first and second storage chambers are both accessible.

3. The refrigerator of claim **2**, wherein, in the first mode, the second door is closed against the first door and the first and second doors are rotated away from the cabinet to provide access to the first storage chamber, and in the second mode, the second door is rotated away from the first door with the first door positioned against the cabinet to provide access to the second storage chamber.

4. The refrigerator of claim **3**, wherein, in the third mode, the main door is rotated away from the cabinet to provide access to the first storage chamber, and the second door is rotated away from the first door to provide access to the second storage chamber.

5. The refrigerator of claim **1**, wherein the operation portion is coupled between the first basket and the at least one rail to selectively restrict movement of the first basket,

and wherein the operation portion is partially exposed via the opening in the first door when the second door is rotated away from the first door in the second mode.

6. The refrigerator of claim **5**, wherein the operation portion includes:

an operation lever rotatably coupled to the first basket, that extends outward from the first basket so as to be exposed when the second door is rotated away from the first door;

a restricting lever coupled to the operation lever and rotated in response to rotation of the operation lever, wherein the restricting lever is configured to be inserted into one of a plurality of adjusting grooves formed in the at least one rail to restrict a moving position of the first basket in the storage case; and

an elastic member coupled to the restricting lever, wherein the elastic member restores an initial position of the restricting lever and the operation lever after the restricting lever and the operation lever are rotated.

7. The refrigerator of claim **1**, wherein the moving basket and the drawer slide together within the storage case along the at least one rail to adjust a vertical position thereof within the storage case.

8. The refrigerator of claim **1**, further including a second basket fixed at an upper end of the storage case to open and close a top surface of the storage case, wherein an open portion of the second basket is oriented toward the opening in the first door to provide a storage space that is separated from the second storage chamber.

9. The refrigerator of claim **8**, wherein the second basket includes:

a basket tray provided in the storage case, that defines the storage space, which is separated from the second storage chamber; and

a basket cover rotatably coupled to the basket tray that opens and closes the open portion of the basket tray.

10. A refrigerator, comprising:

a cabinet that defines a main storage space; and

a main door coupled to the cabinet, wherein the main door includes an outer door and an inner door, the inner door including an outer portion defined to be opposite the cabinet and an inner portion defined to be opposite the outer portion, and an opening that passes through the inner portion and the outer portion, and wherein the inner door further includes:

a first basket coupled to the inner door so as to be vertically movable, the first basket having a basket storage space to receive and store food therein, wherein the first basket, which is coupled to the inner door, is movable vertically along the inner door;

an operating portion configured to vertically move the first basket;

a second basket fixed to the inner door, wherein, in a nested mode, the first basket is slidably positioned at a same height as the second basket such that the first and second baskets overlap each other when the first basket is moved downward to the same height as the second basket;

a first coupling portion configured to couple the first basket to the inner door, wherein the coupling portion is provided at the outer portion of the inner door, wherein the first coupling portion maintains a distance between the first basket and the inner door constant while the first basket moves vertically, wherein the operation portion is positioned closer to a user than the basket storage space such that the user operates the operating portion by passing through the opening, but not passing through the basket storage space, wherein the first coupling portion is positioned closer to a user than the basket storage space such that the operation portion and the first coupling portion are connected to each other at an outer portion of the basket storage space without passing through the basket storage space, and wherein, the first coupling portion includes:

a first guide member and a second guide member that extend vertically along an installation surface of the inner door; and

a movable member received between the first guide member and the second guide member such that the first and second guide members guide movement of the moveable member, wherein the first coupling portion is arranged in front of the basket storage space provided when the inner door is closed against the cabinet and the outer door is rotated away from the inner door to provide access to the basket storage space, and wherein the operation portion is partially exposed via the opening in the inner door such that a user can operate the operation portion via the opening in the inner door when the outer door is rotated away from the inner door.

11. The refrigerator of claim **10**, wherein the movable member includes:

a supporting piece provided at a distal end of an extension piece that extends outward from a front end of the first basket, the supporting piece having two opposite sides thereof respectively supported by the first guide member and the second guide member; and

a first bent piece that extends outward from the supporting piece toward the second guide member.

12. The refrigerator of claim **10**, wherein the first guide member includes a rack having a plurality of grooves formed therein, and wherein the moveable member includes a hook configured to be engaged in one of the plurality of the grooves to selectively fix a vertical position of the first basket on the inner door.

13. The refrigerator of claim **10**, further including:

a second basket fixed to the inner door; and

a second coupling portion that fixes the second basket to the inner door, wherein the second basket is installed below the first basket, and wherein the second coupling portion includes an accommodation space to accommodate the movable member of the first coupling portion therein.

14. The refrigerator of claim **13**, wherein the second coupling portion includes:

a first fixing piece and a second fixing piece spaced apart from the first fixing piece, wherein the first and second fixing pieces fix the second basket to the inner door, and wherein the accommodation space is formed between the first fixing piece and the second fixing piece.

15. The refrigerator of claim **14**, wherein, in a nested mode, the first basket is slidably positioned at the same height as a second basket and received within the second basket.

16. The refrigerator of claim **13**, wherein the first coupling portion includes a pair of first coupling devices respectively provided at two opposite ends of the first basket, and wherein the second coupling portion includes a pair of second coupling devices respectively provided at two opposite ends of the second basket, at positions respectively corresponding to the pair of first coupling devices.

17. The refrigerator of claim **10**, wherein a bottom surface of the first basket is open.

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